

User's Guide



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It is the policy of OMEGA to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification.

The information contained in this document is believed to be correct, but OMEGA Engineering, Inc. accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

WARNING: These products are not designed for use in, and should not be used for, patient-connected applications.

Read First, Important Changes

Errata Sheet For: OML Operating Manual M-3923/0303
Errata date November 2002

1. **Page 8, 3.0 Operation**
The jumpers are not active. The units are only being supplied with the address settings being installed at the factory in firmware. We anticipate a software upgrade to allow the address settings to be user configurable. This should be complete second quarter 2003.
2. **Page 8, 3.1 Setting the OML-RM and OML-TM Addresses**
Do not attempt to alter the address settings with the jumpers. See 1. above.

Safety and License-free Operation

The OmegaLynx modules can be safely operated when the instructions in this manual are carefully followed. This section summarizes the safety considerations. Reminders, in the form described below, will appear in the detailed instructions to assure operator awareness of these safety considerations. Qualified personnel should install and maintain the OmegaLynx modules only after becoming thoroughly familiar with this manual.



WARNING: This symbol is used in the instruction manual where the safety of the operator must be considered. The instruction manual should be consulted and read carefully.



CAUTION: This symbol is used when caution is needed to prevent damage to equipment. It is used where careful attention to certain procedures described in the instruction manual is needed. This symbol is also used to emphasize procedures other than normal operating procedures.

SAFETY SUMMARY



WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE.

1. Make sure that the OML-series module is securely mounted to the DIN rail.
2. Disconnect the power to the module before connecting or disconnecting sensor or system wiring.
3. To reduce the risk of electric shock, do not attempt repairs to module. No user-serviceable parts are inside. Refer all servicing issues to Omega Engineering, Inc.
4. Do not attempt to operate a module without the protective case secured.
5. All wiring must be connected to the module before electrical power is connected. Inspect for frayed or cut cables prior to operation.
6. Do not expose this equipment to rain or moisture.
7. All wiring and connections must follow the National Electric Code and local electrical codes.
8. Use common sense and avoid haste!
9. Review Specification in Appendix for suitability of use.



WARNING: In order to comply with FCC RF Exposure requirements, this device must be installed in such a way as to insure a minimum separation distance of 20 cm between the antenna and all persons, during normal operation.



WARNING: If the FCC ID is not visible when this unit is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. A sample label has been provided below. This label should be clearly legible and contain the text that reads:

**Contains Transmitter Module
FCC ID: QAQBLM-0301-1**

LICENSE-FREE OPERATION



WARNING: The user has the privilege of operating this equipment without obtaining a license from the Federal Communication Commission (FCC) providing the user makes no changes or modifications to the OML-series modules. Changes to the modules not authorized by Omega Engineering, Inc. could void the user's authority to operate the OML-series modules without a site-specific FCC license.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.



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1.0 Product Description

The OmegaLynx® OML-series of modules are designed to allow extension of process control loop instrumentation using a Radio Frequency link. The wireless receiver and transmitter modules use the Bluetooth™ wireless technology operating in the 2.4 GigaHertz (GHz) license-free band. Bluetooth™ allows wireless data communication up to 100 meters within typical factory environments. The transmitter and receiver modules communicate using frequency hopping spread spectrum communication.

Transmitter and receiver modules are available with four (4) channels of 4-20 mA or 1 to 5 Volt process loop data. The user process data transmission is unidirectional, i.e. - a transmitter/receiver pair sends all data in one direction only. Consequently, the transmitter module is the data input module, connecting to the 4-20 mA loop sensors, and the receiver module is the data output module, connecting to the process control loop instrumentation equipment input channels. The transmitter module samples each channel 10 times per second.

The modules have seventeen (17) terminals arranged in three terminal blocks. Each data channel has three (3) connections, the power input uses three (3) terminals, and (2) connections are a set of dry contacts (normally open) that will close upon a communication link failure. The input and output channels are unipolar. The signal input range is from zero (0) volts to positive 5 volts, full scale, on the transmitter module and 4 milliamperes to 20 milliamperes on the receiver module. Each module has an RF connector for the antenna and three Light Emitting Diode (LED) indicators.



Figure 1: Side View OML



Figure 2: Front View OML

2.0 Installation

2.1 Mounting

2.1.1 Installation and Removal

The OML-series OmegaLynx® modules mount to standard 35 mm DIN rail mounts. The module base has a spring-loaded snap-in mount. To mount the module place the fixed end of the mounting over the DIN rail and, using a screwdriver blade, gently pull the spring-loaded clip of the module down until it locks into place. Since the module has two clips, each must be locked into place.

To remove the module, simply use a screwdriver blade to release the spring-loaded clip of each mount of the module. See figure 3.

2.1.2 Location

The OML-series OmegaLynx® modules will not function correctly when mounted within steel, aluminum, or other electrically conductive boxes. The modules are radio transmitters and receivers and, as such, the antenna must be located where the radio signals can propagate to other modules. This can be accomplished through using electrically nonconductive boxes or locating the antenna at a distance from the module. When two or more modules are located in redundant proximity to one another, the antennas of the module must be spaced at least 8 inches (20 cm) apart.

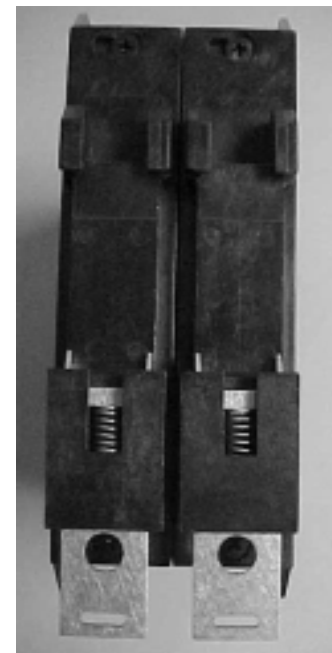


Figure 3: OML Rear View showing
DIN rail clips with screwdriver
release slots at the bottom



Figure 4: Mounting Locations

Ideally, the transmitter and receiver modules should be located within a direct line-of-sight view of each other. However, they can function well as long as there are no reinforced concrete or solid metal walls between the modules. The modules will be able to communicate even if there are machines located between the modules so long as there are no solid conductive walls between the modules. If the modules are separated by walls of reinforced concrete or steel, data transmission cannot be guaranteed. See figure 4.

The OML-TM and OML-RM must be located no more than 100 meters from each other. The ground connections for each module are not required to be common. Each module may have its own grounding path independent of the other module, so long as each is grounded.

This unit is designed and tested for a “pollution degree 2” environment and classed as installation overvoltage category II.



WARNING: To avoid human exposure to potentially harmful levels of radio frequencies, the module antenna should be located at least seven (7) feet above floor level.

2.2 Interface Connections

The terminal definitions for the OML-TM and the OML-RM are the same. Each module has seventeen (17) terminal connections. Each of the (4) channels have three (3) terminal connections, the communication failure dry relay contacts use two (2) terminal connections, and the power uses three (3) terminal connections. The appendix to this manual provides a detailed description of the terminal definitions.

All wiring for 4-20 mA loops are uni-polar, that is, all voltages are entirely positive with respect to the ground reference. The negative termination serves as the circuit common (or low side) of the circuit. The shield terminal is coupled to the module ground reference (-24 VDC). The shield of the system wiring, whether for the transmitter or receiver, should always be connected at the module shield terminal to minimize spurious RF signal radiation.



CAUTION: Precautions must be taken to avoid generating a ground loop in the receiver wiring since the internal module connection of the shield outputs in the receiver module is coupled to the module negative power (-24 VDC) connection. Failure to avoid ground loops will result in erroneous or noisy signals.

The modules require a 12 VDC to 27.5 VDC, 24VDC nominal, power source capable of 275mA. Power supply ripple should be less than 200 mV peak-to-peak. The power supply unit should be a direct plug-in marked “CLASS 2” rated for 275 mA. The connection between the power source and the module must not exceed 10 feet (3 meters). Module power is applied through the (+) and (-) terminals of the power connection on J3.

The Omega model U24Y101 is suitable.

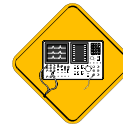
Note: The earth (ground) connection should be connected to provide an earth path.

2.2.1 Transmitter Module OML-TM

The OML-TM connects to the field sensor wiring. This module allows up to four (4) 4-20 mA sensors or 0 to 5 Volt sensors to connect to the module. Whether a particular channel is set for 4-20 mA loop sensors or 1-5 Volt sensors is determined by a user-accessible jumper. Each channel operates independently and can be individually wired for either 4-20 mA loop or 0 to 5 Volt sensor wiring. The jumper inserts the 250-ohm resistor when the input will be defined as a 4-20 mA loop current. If the input will be a 0 to 5 Volt signal, the jumper must be removed. Accessing the jumpers is explained in the appendix to this manual.

The input to the transmitter module is actually a 0 to 5 Volt signal. The resistor operates to convert the loop current of 4 to 20 mA into 1 to 5 Volts by the operation of Ohm's Law. That is also why 1 to 5 Volt sensors can be directly connected to the input terminals when the jumper is not installed.

CAUTION: The module is shipped from Omega with all jumpers installed (4-20 mA loop operation). If 0-5 Volt operation is desired, the jumpers must be removed.



Accessing the jumpers is explained in the appendix to this manual. The jumpers are defined as: JP6 - Channel 1, JP7 - Channel 2, JP8 - Channel 3, and JP9 - Channel 4.

The module antenna should be adjusted so as to be in a vertical position and no more than 4 foot-pounds of torque should be used to tighten the non-standard FCC compliant SMA antenna connector on the front panel of the OML-Series module.

2.2.2 Receiver Module OML-RM

The OML-RM connects to the receiving instrument Programmable Logic Controller (PLC) or Distributed Control System (DCS) wiring. This module allows the four (4) outputs to connect to the PLC or DCS. Each channel operates independently and is wired for 4-20 mA loop current output. Voltage outputs can be achieved using externally installed 250 ohm resistors.

Each channel jumper bypasses the coupling capacitor used for RF bypass operation and makes the shield output connection connect directly to the chassis ground of the OML-RM module. Removing the jumpers allows the shield to be AC coupled for an RF path, but not have a low frequency DC ground loop. Accessing the jumpers is explained in the appendix to this manual.

The jumpers are defined as: JP4 - Channel 1, JP5 - Channel 2, JP6 - Channel 3, and JP7 - Channel 4.

The output of the receiver module is a 4 to 20 mA signal referenced to the power supply “-” (minus) input. If power is obtained from the DCS/PLC system, care must be taken to provide a short low-ohmic path between the module negative supply terminal and the ground terminal of the DCS/PLC system. Failure to do so will likely result in noise in the 4-20 mA input of the DCS/PLC.

The module antenna should be adjusted so as to be in a vertical position and no more than 4 foot-pounds of torque should be used to tighten the non-standard FCC compliant SMA antenna connector on the front panel of the OML-Series module.

3.0 Operation

The OML-TM and OML-RM modules are shipped with a “default” address by Omega Engineering, Inc. to enable communication with each other. The Bluetooth™ communication protocol uses a frequency hopping spread spectrum technique operating in the 2.4 GHz ISM band. The spread spectrum technique used by the OmegaLynx modules requires the OML-RM and OML-TM to hop frequencies at the same time and in the same sequence to maintain communication. Any module pair must use the same address setting, otherwise no communication between them will occur. The appendix to this manual shows drawings that identify the location of the eight (8) address jumpers. The least significant address jumper is illustrated with “LSB” and is located toward the front of the module.

The OML-TM and OML-RM in a pair must be set to the same address and that address must be unique. That is, no two module sets must have the same address jumper settings.



CAUTION: Failing to observe the precaution of setting module addresses to different values in the same facility, will result in erroneous data.

The modules are certified by the Federal Communication Commission for operation in the 2.4 GHz band without the need for an operator license.

3.1 Setting the OML-RM and OML-TM addresses

The OML-RM receiver and OML-TM transmitter modules are shipped from Omega Engineering with “default” addresses set in the modules. It is necessary for the OML-RM receiver and OML-TM transmitter module pair to have the same address setting. It is also important that no other OML-RM receiver and OML-TM transmitter module pairs have the same address. The cover panel can be removed by the user to access the jumpers used to set the module address. See the Appendix for instructions regarding accessing the interior of the modules.



WARNING: Do not make changes to the jumper settings while power is connected to the module. Disconnect all power before attempting jumper setting changes.

The address jumper area has eight (8) sets of jumper pins allowing up to 256 possible address settings. Both modules in a pair must have their jumpers set exactly the same for proper data communication. Any setting may be used provided it is not the same as any other module pair installed within 1,000 meters.

CAUTION: No module pairs may have the same address setting as any other module pairs installed within 1,000 meters. Setting other nearby pairs to the same address can result in communication of data to the wrong module receiver.



3.2 Powering the OML-RM and OML-TM

The OML-RM receiver and OML-TM transmitter modules will power up immediately upon application of DC power to the power input terminals of the modules. The green LED on the panel will illuminate whenever the 24 VDC power is connected. The powering voltage must be between 12 and 27.5 Volts DC.

3.3 Verifying operation

After power is applied to the module the internal digital processor will verify proper module operation and extinguish the red LED. If the red LED illuminates it means the processor has detected a fault condition. In case of a fault condition, check the module power and RF connection to the antenna. For additional assistance, contact Omega Engineering Customer Service. If any OML-TM signal input falls outside the normal operating range of 3.6 mA to 22 mA (0.9 Volt to 5.5 Volt) the red LED on the front panel of both the OML-TM and OML-RM will flash approximately once per second (1 Hz).

3.4 Establishing Communication

Once power is applied, assuming the module is operating correctly, it will transmit a signal to synchronize with its factory programmed counterpart unit. There are three flashing sequences of the Blue “DATA” LED used to indicate the status of the communication link:

LED very fast flashing (30 Hz). Indicates attempting linking activity.

LED steady flashing (10 Hz). Indicates normal communication of data packets.

LED off. Indicates the communication link has been lost.

3.5 Communication Failure

If the communication channel between units is interrupted for any reason, after one minute the red “COMM FAIL” LED on the front of the unit will illuminate to indicate a communication link failure. If the event that caused the failure clears, the units will automatically reestablish the communication link. In the event the units cannot reestablish the communication link within 60 seconds, the dry contacts of the “COMM FAIL” relay will close, and the units will continue to attempt to reestablish the communication link. The contacts will open if the units succeed in establishing the link.

4.0 Maintenance

The OML-Series modules contain no user serviceable or operator replaceable parts. No maintenance should be attempted by the user. Opening the module and attempting any maintenance will void the user warranty and the Federal Communication Commission (FCC) certification.

Access to the OML-Series of modules is limited to the jumper plugs for setting channel configurations and module addresses.

There are no cleaning, cooling, or ventilation requirements for the OML-Series modules.

Appendix A:

Accessing the OML internal jumper positions

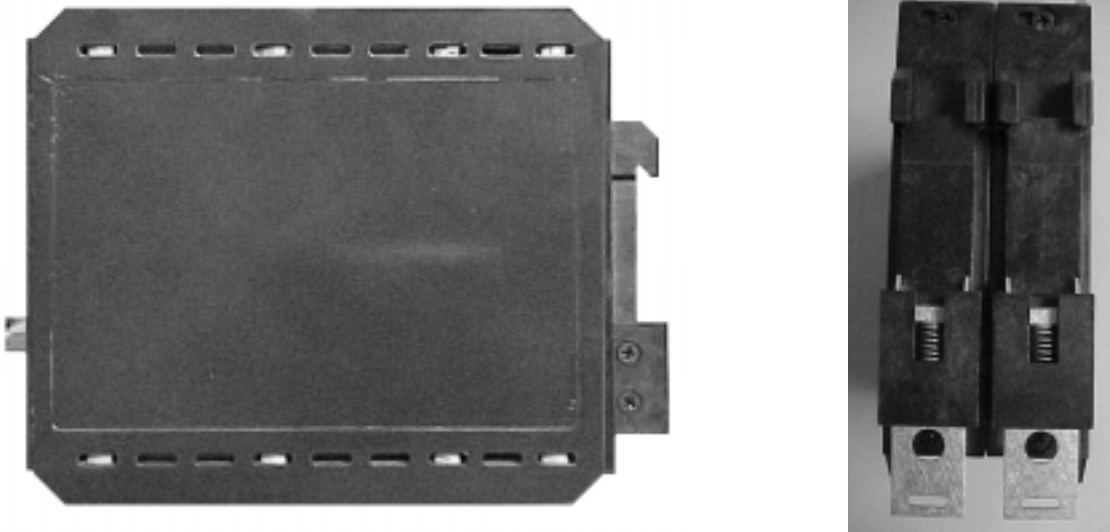


Figure A-1

Lay the module on a clean surface with the right side of the module facing up, as shown above.

Using a Philips head screwdriver, remove the screws holding the DIN rail mounting clips from the rear of the module. Note there are retaining screws that are accessible through the round holes of the spring loaded DIN retaining clips. These screws must also be removed. A total of four screws will have been removed.”

When the mounting base has been removed, the right side cover can be removed by sliding it to the rear of the case.

The Transmitter Module (OML-TM) has internal jumpers located in different positions than the Receiver Module (OML-RM).

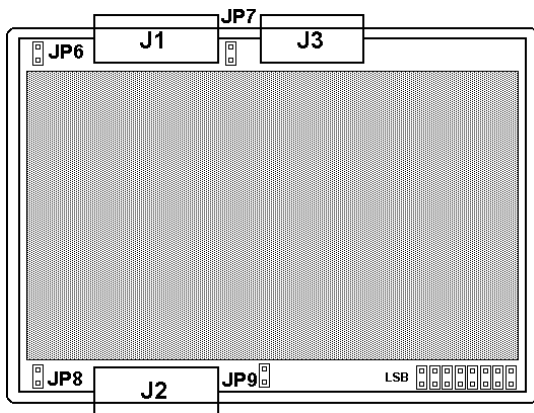


Figure A-2: OML-TM Transmitter Module

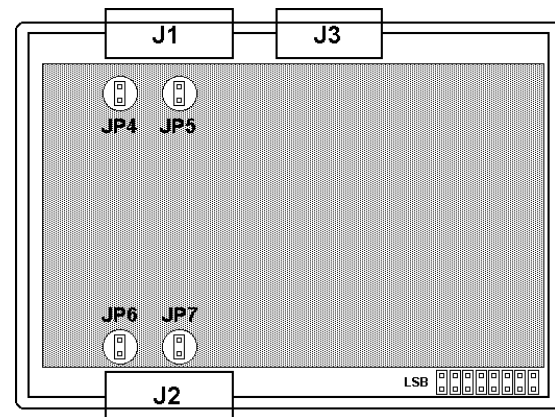
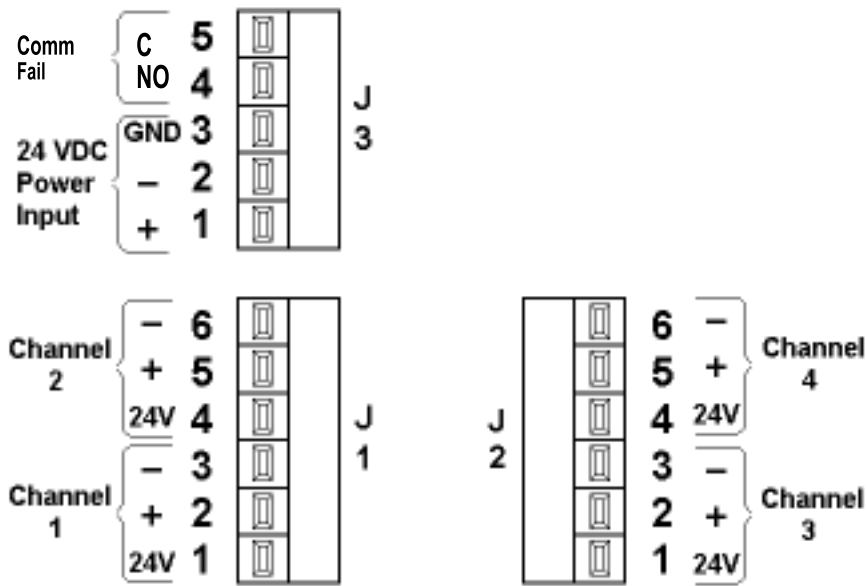


Figure A-3: OML-RM Receiver Module

The transmitter module jumpers determine whether any particular channel is defined as a 4-20 mA input or a 0 to 5 Volt input. When the jumpers are installed, that channel will be a 4-20 mA input.

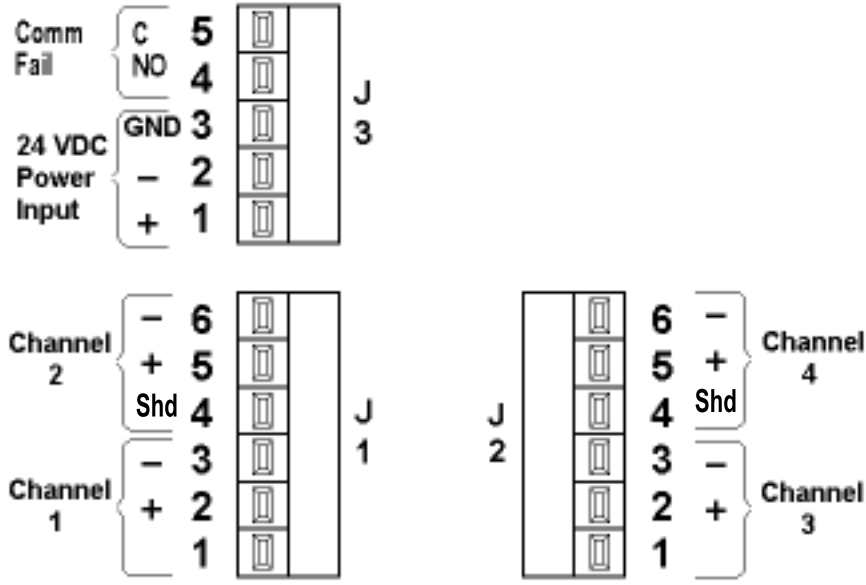
The receiver module jumpers determine whether a particular channel shield connection will be AC coupled to ground or DC coupled to ground. The AC coupling is through a 0.01 microFarad capacitor for RF coupling. When the jumpers are installed, that channel will be DC coupled.

OML-TM Module Terminal Definitions



J1 and J3 are on the top of the OML modules, while J2 is on the bottom of the module. For each of the OML-TM transmitter channels, a 24 VDC connection is available for powering the 4-20 mA loop sensors.

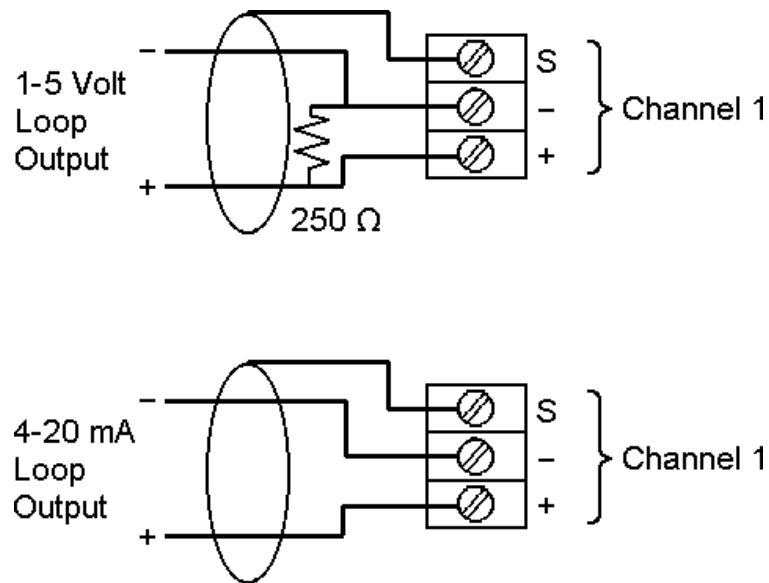
OML-RM Module Terminal Definitions



J1 and J3 are on the top of the OML modules, while J2 is on the bottom of the module. For each of the OML-RM receiver channels, a ground connection is available for the shield of the loop wiring.

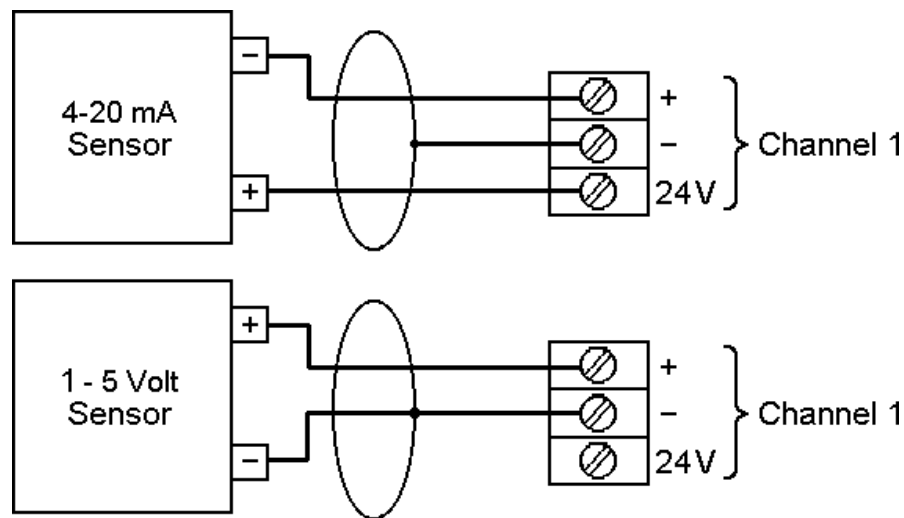
OML-RM Module Terminal Definitions and Wiring

The output of the OML-RM can be configured for either a 4-20 mA current loop or a 1-5 volt voltage output. To convert the 4-20 mA loop current to a 1-5 volt signal, a 250 ohm resistor must be placed across the wiring of the output loop current. This resistor may be placed across either the module output terminals or the input terminals of the measurement system.



OML-TM Module Terminal Definitions and Wiring

The transmitter module will be wired differently depending on whether the sensor is a 4-20 mA unit or 1-5 volt unit. The diagram below illustrates the wiring for each type of sensor.



OML Series Specifications

SPECIFICATIONS	OML TRANSMITTER	OML RECEIVER
WIRELESS TRANSMISSION		
Technology Platform	Bluetooth™	Bluetooth™
Modulation	Frequency Hopping Spread Spectrum	Frequency Hopping Spread Spectrum
Radio Frequency	2.4GHz license-free band	2.4GHz license-free band
Communication Range	100 Meters	100 Meters
Output Power	+20 dBm / 100 mW	+20 dBm / 100 mW
Number of Channels	Four	Four
ELECTRICAL		
Power Requirements		
Voltage Requirements (Class 2)	24 VDC (12 - 27.5 VDC)	24 VDC (12 - 27.5 VDC)
Current Requirements (Class 2)	275 mA (max)	275 mA (max)
Power Supply to 4-20mA Sensor	24 VDC	n/a
Data Resolution	16-bit	16-bit
Signal Bandwidth	10 Samples per second	10 Samples per second
Input Signal (jumper configurable)	Four 4-20mA (250Ω input impedance)/ 1-5 VDC (50KΩ input impedance)	Radio Frequency Signal
Output Signal	Radio Frequency Signal	4-20mA signal (Max 750Ω load)
LED Indicators	Power - Green Data - Blue Comm Fail - Red	Power - Green Data - Blue Comm Fail - Red
ENVIRONMENTAL		
Operating Temperature	0 - 50°C (32 to 122°F)	0 - 50°C (32 to 122°F)
Humidity	5% to 90% non-condensing	5% to 90% non-condensing
Pollution	Degree 2	Degree 2
Installation Overvoltage	Category 2	Category 2
PHYSICAL		
Dimensions (H x L x W)	5.8" x 4.5" x 1.7" (14.7cm x 11.4cm x 4.3cm)	5.8" x 4.5" x 1.7" (14.7cm x 11.4cm x 4.3cm)
Weight	0.8 lbs. (0.37kg)	0.8 lbs. (0.37kg)
Connector	Screw Terminal	Screw Terminal
Mounting	DIN-Rail	DIN-Rail

Appendix B: CE markings, EMC compatibility

As of February 2002, French CE standards for EMC (Electro-Magnetic Compatibility) are NOT harmonized with the Current 15 EU Member States.

Current Countries Recognizing CE Mark:

EU 15 Member states:

Austria (**became member in 1995**), Belgium (**Founder Member in 1957**), Denmark (**1973**), Finland (**1995**), France (**FM 1957**), Germany (**FM 1957**), Greece (**1981**), Ireland (**1973**), Italy (**FM 1957**), Luxembourg (**FM 1957**), the Netherlands (**FM 1957**), Portugal (**1986**), Spain (**1986**), Sweden (**1995**) and United Kingdom (Great Britain)(**1973**).

Candidate States:

Some are requiring CE Marks. Check with Appropriate agencies for details regarding use in country in question .

CE Marking and EU/EFTA

The 15 EU Member states legally require CE-Marking. The European Free Trade Association (EFTA*) countries, with the exception of Switzerland, also enforce CE-Marking. The 12 European countries on application to become EU Member states have started to adopt the CE-Marking requirements to ensure that their products can freely move throughout the EU member States in the future. Check with Appropriate agencies for details regarding use in country in question.

*-Iceland, Liechtenstein, Norway and Switzerland are EFTA countries

Note: France is not completely harmonized in frequency allocation for the standard ISM band this product utilizes from 2402 MHz to 2480 MHz.



WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of 13 months from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal one (1) year product warranty to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by it will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESS OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR WARRANTY RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR NON-WARRANTY REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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